

Shigeru KUMANO: Sexual reproductive organs of *Bostrychia flagellifera* POST (Ceramiales, Rhodophyta) from Japan

Key Index Words: *Bostrychia flagellifera*—procarp—spermatangia—3-celled carpogonial branch. Shigeru Kumano, Department of Biology, Faculty of Science, Kobe University, Rokko-dai, Nada-ku, Kobe, 657 Japan.

POST (1936) described *Bostrychia flagellifera* as a new species from Paramatta River in Sydney, Australia. POST (1961) identified Japanese specimens collected from Sakurajima Volcano as *B. flagellifera* and reported the structure of thallus, tetrasporangial stichidia and cystocarps, but no observations are available on the procarps and spermatangia.

This paper deals with observations on sexual reproductive organs based on the specimens of *Bostrychia flagellifera*, collected by the late Dr. Hiroshi ITONO of Kagoshima University, from Sonoyama-ike in Sakurajima Volcano, Kagoshima Prefecture in Japan, on September 5, 1981. The specimens examined were deposited in the Herbarium of Faculty of Science, Kobe University.

Bostrychia flagellifera is monoecious, the spermatangial sorus (Figs. 2, 7 and 8) is found to form at the terminal portion of fertile branches in conjunction with a procarp. The axial cell (Figs. 2 and 5, AC) divides longitudinally to produce four to five pericentral cells, called as primary parent cells (Figs. 2 and 5, PPC).

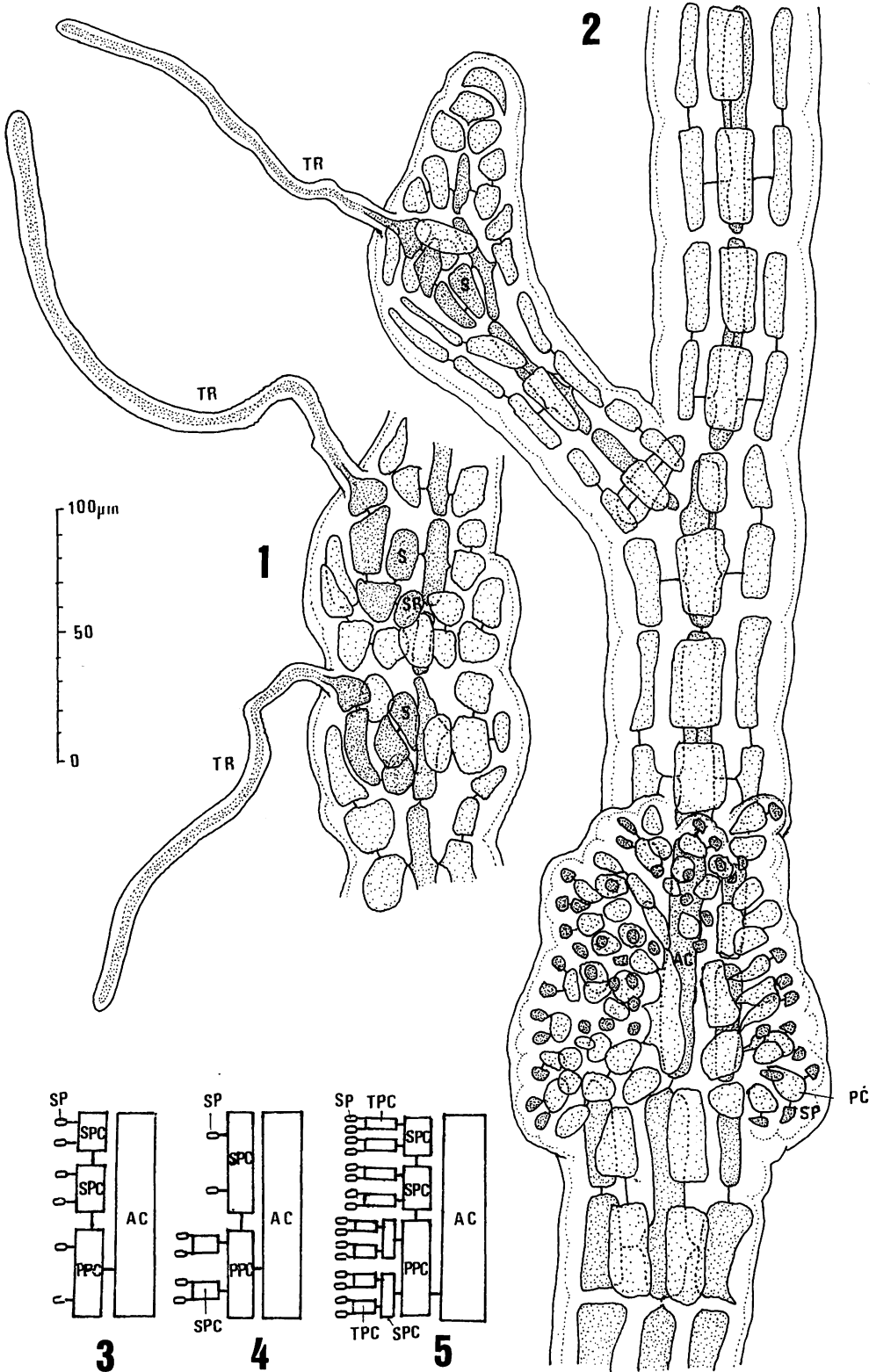
Each primary parent cell divides to produce secondary parent cells (Figs. 2 and 5, SPC), each of which divide successively to produce tertiary parent cells (Figs. 2 and 5, TPC). The tertiary parent cells (Figs. 2 TPC, PC) produce 1-2 spermatangia (Figs. 2 and 5, SP).

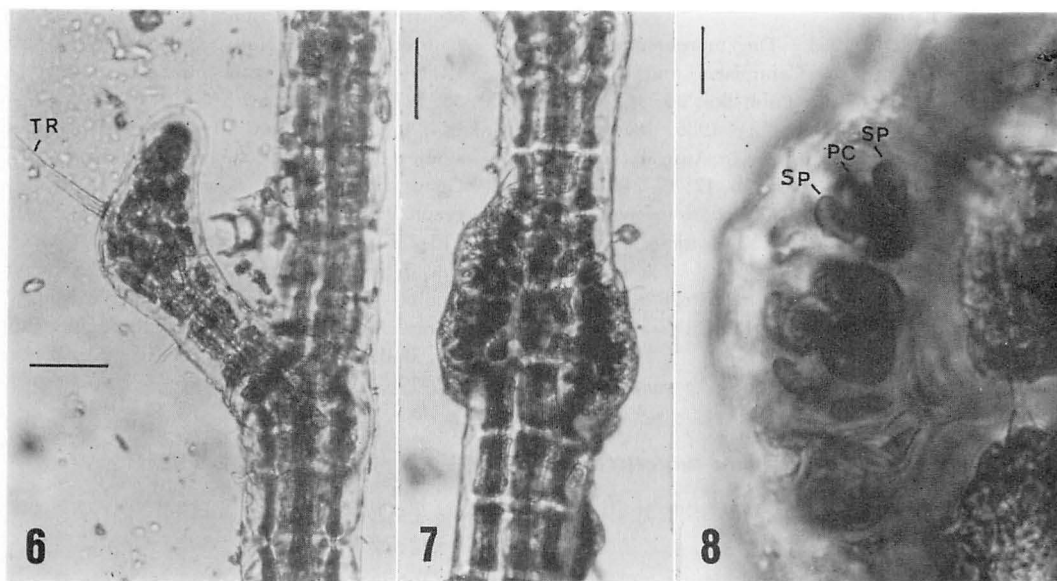
FALKENBERG (1901) observed that the axial cell of *Bostrychia tenella* is surrounded

by pericentral cells and one layer of cortical cells, each of which directly produces a spermatangium. SMITH and NORRIS (1988) reported the linear arrangement of a single primary parent cell (Fig. 3, PPC) connection to chains of secondary parent cells (Fig. 3, SPC) for *B. binderi*. Spermatangia (Fig. 3, SP) of this species were produced from both primary and secondary parent cells. Each primary parent cell (Fig. 4, PPC) of *B. montagnei* was pit-connected to at least three spermatangium producing, secondary parent cells (Fig. 4, SPC) in a di- or trichotomous arrangement.

In the present study, it is observed that each primary parent cell (Fig. 5, PPC) of *B. flagellifera* produces successively secondary (Fig. 5, SPC) and tertiary parent cells (Fig. 5, TPC, Figs. 2 and 8, PC), which have some analogy with cortical cells. The tertiary, and sometimes secondary parent cells (Figs. 2 and 8, PC) were observed to produce 1-2 spermatangia (Figs. 2 and 8, SP).

The axial cells of the terminal portion of the thallus produce 3-4 pericentral cells and usually one procarp is formed on each sector. A sterile pericentral cell divides transversely into two tier cells in the same manner as the vegetative portion of the thallus. Procarp consists of a supporting cell (Figs. 1 and 2, S) and 3-celled carpogonial branch with one sterile cell (Fig. 1, SR) or none (Figs. 1, lower one, and 2). Since the four-celled carpogonial branch (Fig. 1, lower one) is observed only once on Japanese specimens collected from Sakurajima Volcano, the 3-celled carpogonial branch is more common than 4-celled carpogonial branch.





Figs. 6-8. *Bostrychia flagellifera* Post. 6. A procarp with a mature trichogyne projecting obliquely toward the tip of the thallus; 7. A spermatangial sorus; 8. A part of a spermatangial sorus. (AC, axial cell; PC, parent cell; PPC, primary parent cell; S, supporting cell; SP, spermatangium; SPC, secondary parent cell; SR, sterile cell; TPC, tertiary parent cell; TR, trichogyne. Scale bars; 50 μm for Figs. 6 and 7; 10 μm for Fig. 8)

The carpogonial branch is directed toward the apex of the thallus and the carpogonium occupies a position lateral to the supporting cell. The mature trichogyne (Figs. 1, 2 and 6, TR) is up to 200 μm long and projects obliquely toward the tip of the thallus.

Most taxon of the Ceramiales have been observed invariably to produce 4-celled carpogonial branches. Many authors such as HOMMERSAND (1963), CORDEIRO-MARINO (1979), TANAKA and CHIHARA (1984a, b), KING and PUTTOCK (1986) have reported the standard Ceramiales-type of 4-celled carpogonial branches in *B. arbuscula* HARVEY, *B. kelanensis* GRUNOW in POST, *B. pinnata* TANAKA et CHIHARA, and *B. radicans* (MONTAGNE) MONTAGNE. Four-celled carpo-

gonial branch of Japanese specimens of *B. flagellifera* Post collected from Sonoyama-ike was observed once, and the post-fertilization and carposporophytes have not been observed.

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Figs. 1-2. *Bostrychia flagellifera* Post. 1. An upper procarp consisting of a supporting cell and 3-celled carpogonial branch with a sterile cell, and a lower procarp consisting of a supporting cell and 4-celled carpogonial branch without a sterile cell; 2. A spermatangial sorus formed at the terminal portion in conjunction with a procarp consisting of 3-celled carpogonial branch without a sterile cell.

Figs. 3-5. Comparison of male reproductive structures for three species. 3. Male reproductive structure of *Bostrychia binderi* HARVEY (SMITH and NORRIS 1988, modified); 4. Male reproductive structure of *B. montagnei* HARVEY (SMITH and NORRIS 1988, modified); 5. Male reproductive structure of *B. flagellifera* Post (present study).

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熊野 茂 : *Bostrychia flagellifera* POST (イギス目・紅藻植物) の有性生殖器官

故糸野 洋博士が鹿児島県桜島の園山池から採集した *Bostrychia flagellifera* POST の標本を観察した。本種は雌雄同株である。皮層細胞と似た方法で、周心細胞から造り出された精子嚢母細胞は 1-2 ケの精子嚢を造る。嚢果は発見出来なかったが、プロカルブは、1 ケの支持細胞、0-1 ケの sterile cell, 3 細胞性 (例外的に 4 細胞性) の造果枝からなる。(657 神戸市灘区六甲台町1-1 神戸大学理学部生物学教室)